

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

Work program (syllabus) of the educational component

MC 3 Innovative Engineering

Specialty	G 13 "Food Technology"
Educational program	"Food Technologies"
Level of higher education	second (master's)

Developer: _____

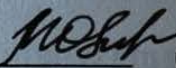
Maryna SAVCHENKO

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)

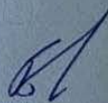
Agreed:

Educational guarantor programs



Maryna SAVCHENKO

Dean of the Faculty,
where the educational program is
implemented



Nataliia BOLHOVA
(Full name)

Review of the work program (attached):

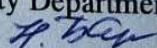


Oksana MELNYK

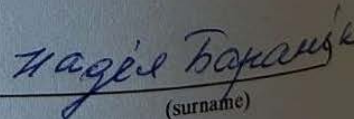


Nataliia BOLHOVA

Methodist of the Education Quality Department,
licensing and accreditation



(signature)



(surname)

Registered in the electronic database: date: _____

18. 06. 2026.

Information on reviewing the work program (syllabus):

Academic year in which changes are made	Number of the appendix to the work program with a description of the changes	Changes reviewed and approved		
		Date and number of the minutes of the department meeting	Head of the Department	Educational program guarantor

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

1.	Name MC	MC 3 Innovative Engineering			
2.	Status EC	Mandatory			
3.	Educational program	Food technology			
4.	Unit implementing EC	Food technology/nutrition technology			
5.	NQF level	Level 7			
6.	Semester of study	First semester Study duration – 15 weeks			
7.	Volume EC	5 credits			
	Total number of hours and their distribution (full-time/part-time)	Contact work (classes)			Independent work
		Lectures	Practical/seminar	Laboratory	
		14/6		46/12	90/132
8.	Language of instruction	English			
9.	Limitation	without restrictions			
10.	Communication with other components	"Automation of Food and Restaurant Production Processes", "Food Machinery and Equipment"			
11.	Purpose of the educational component	Training of highly qualified specialists who have mastered theoretical and practical knowledge and skills of professional activity and are able to further independently deepen and expand them, using them in practice.			
12.	Study prerequisites	The educational component is based on the previously studied disciplines "Processes and devices of food production", "Automation of Food and Restaurant Production Processes", " Food Machinery and Equipment"			
13.	Academic Integrity Policy	If cheating is discovered during the exam, the student's work is canceled and the exam is retaken. Code of Academic Integrity (http://surl.li/khyd)			
14.	Keywords	Engineering, world innovations, project, laboratory equipment, food industry			
15.	Course number on the Moodle platform	Moodle link: https://cdn.snau.edu.ua/moodle/course/view.php?id=5773 Savchenko Maryna Yuriivna			

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

Learning outcomes for MC: 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 1	PLO 5	PLO 7	PLO 10	PLO 12	PLO 13	
DLO1. Analyze the current state of food production, innovative services, global and domestic trends. Systematize main stages of resource provision in production.	x						Control work on theoretical material / certificate of completion of non-formal education courses. Completion and defense of laboratory work. Exam
DLO 2. Apply methods of comparative analysis of different technological solutions, for example, the choice of raw materials, equipment or processing methods, taking into account their advantages and disadvantages. Be able to evaluate alternatives according to the criteria of efficiency, cost, environmental impact and compliance with regulatory requirements.		x					
DLO3. Apply knowledge of modern engineering approaches to creating innovative products, optimizing technological processes, and ensuring the quality of food products. Have a holistic understanding of the principles of innovative engineering, including the application of biotechnology, nanotechnology, automation, and digitalization in the food industry.			x				
DLO4. Analyze innovative solutions in the field of food technology and formalize them in the form of scientific and technical documentation, scientific reports, patent documents, articles, etc.				x			
DLO 5. Apply knowledge about the impact of innovation processes on the development of production; about venture business and new forms of integration of science and production.					x		
DLO 6. Assess the balance of social benefit and economic benefit, creating products that are affordable for consumers and profitable for producers. Apply the principles of sustainable development: minimize waste, use environmentally friendly raw materials. Optimize technological processes to reduce costs (raw materials, energy, equipment) without losing product quality.						x	

¹Must comply with the Matrix of ensuring program learning outcomes by the relevant components of the educational program, indicated for mandatory educational components of EP I and II levels, for all (mandatory and selective MC)

3. CONTENT OF THE EDUCATIONAL COMPONENT (COURSE PROGRAM)

Topic. List of issues to be addressed within the topic	Distribution within the overall time budget		Independent work	Recommended literature
	Classroom work			
	Lc	Lb		
Topic 1. The concept of Innovative Engineering. The main activities and directions of Innovative Engineering. Purpose of studying the discipline. Objectives of the discipline. General characteristics of innovative engineering. Classification of innovations. Engineering services. Global and domestic trends. Innovations. Content and stages of innovation processes. Concept and types of engineering. Main components of engineering. Types of innovative engineering functions. Main directions of rationalization of labor organization. Main stages of observation and data processing. Innovative engineering in resource security of food enterprises	2	2/2	10/18	[1-8]
Topic 2. Innovation engineering. Information material. Definition of the main components of engineering. Structuring competitiveness by levels, taking into account the impact of innovations and the life cycle of innovations. Optimization of technological processes. Optimization of labor resources. Innovative principles of equipment use. The essence and types of innovations in the food industry. Signs of innovations. Properties of innovations. Diffusion of innovations. Factors initiating innovations. Main stages of introducing technology into production. Modern approaches to selecting resources to ensure production. Assessment of the effectiveness of introducing technology into production. Main directions of rationalizing labor organization. Methods for determining working time costs and their optimization. Assessment of the effectiveness of decisions made to optimize labor.	2/2	4/2	12/18	[9-13,15-20]

Topic 3. Concept of an innovative project. The concept of a project and its classification. Project management. Methods of selecting innovative projects for implementation. The essence and basic principles of measuring the effectiveness of innovations. Innovative approaches to technological design of food enterprises. Feasibility study of innovative projects and modeling of technological operations. Innovations in technological design. Innovative processes of new product design and analysis of project results. The concept of accelerated and combined design. Social, institutional and environmental analysis of an innovative project. Modern management of innovative projects.	2	4/2	12/18	[21-28]
Topic 4. Innovative activities of enterprises. Organizational forms of ensuring and implementing results. Concept of the State Target Program. Formation of an innovation model at the enterprise. Influence of innovation processes on the development of production. Venture business and new forms of integration of science and production. Basic concepts of scientific and technical developments. Features organizational forms of ensuring innovative activities. Scientific, technical and innovative activity of enterprises. The purpose of entrepreneurial activity. Subjects of innovative activity. Innovative activity of enterprises. Stages of formation of an innovative model at the enterprise. Institutionalization. Sphere of innovative activity.	2/2	2/2	12/18	[29-38]
Topic 5. Innovations in the food industry. Innovative activity in the dairy industry: conditions and prospects for its development. Methodological support and practice of increasing the efficiency of the dairy industry based on innovative activity. Innovative activity in the meat industry: conditions and prospects for its development. Ecological innovations in the meat industry. Innovations in fruit and vegetable production.	2	2/28	12/8	[39-48]
Topic 6. Organization of laboratory work. Safety techniques. Types of laboratory equipment. Basic safety rules when working in a biochemical laboratory. Reagents and their handling. Safety equipment. Measuring instruments. Laboratory glassware sets. Analytical laboratory equipment, test laboratory equipment	2	7/2	20/36	[49-53]

Topic 7. Global and domestic innovations. Innovative processes of drying, freezing and defrosting of food products. Innovative technologies, equipment and automated equipment (robotics). Technology of caviar products with a capsule structure. Energy- and resource-saving waste-free technologies. <i>A review of interdisciplinary approaches in modern engineering.</i> <i>Examples of successful innovations created at the intersection of engineering and social sciences (environmental technologies, optimization of production technologies, etc.) - as part of the internship.</i>	2/2	2	12/18	[1-4,54-63]
Total	14/6	46/12	90/132	

4. TEACHING AND LEARNING METHODS

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)	Keel number of hours
DLO1. Ensure optimization and innovative approaches to scientific, technical and innovative activities of enterprises. Analyze innovative principles of using equipment. Systematize the mainstages of introducing technology into production.	Lectures: - Informational (educational). The lecture informs students about the achievements of science, the main provisions of the academic discipline, reveals the features of each topic, and introduces a problem that has been solved by science or is being solved now. - Orientation. Orients students to the genesis of the development of various theories, in which literary sources they can be found and become acquainted. The lecturer recommends an approximate list of literature.	10/4	Preparation to the lecture by familiarizing yourself with the lecture material. Searching for technical solutions in information sources	20/26

	- Stimulating arouses interest to the topic. - Motivational. Develops interest to science, cognitive needs, conviction in the need to study science, in its theoretical and practical significance. - Clarifying, explanatory. Explanation of concepts that are components (core) of this topic. Explaining and explaining the quintessence of the theory, it is necessary to achieve an adequate understanding by students of the scientific content of the concepts. Convincing. With an emphasis on the system of evidence. - Developing is associated with the task of forming the cognitive activity of the audience, requires conducting a lecture presentation as a process of independent creative cognition. The function is determined by the need to provide optimal conditions for the intellectual development of the individual by involving him in active mental activity. - Problematic. New theoretical material is presented as an unknown that should be discovered by solving a problem situation. Presentations (demonstration in formation on the topic). Laboratory classes Analyze the ways of selecting the necessary information on innovations in technology using examples of calculations from scientific and technical literature Consultations. Answers questions, exchange of opinions, a short discussion with the teacher's conclusions.			
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DLO2. Analyze the technical and economic indicators of innovative projects. Be able to assess the effectiveness of introducing technology into production. Develop modes equipment operation in order to optimize them and optimize labor	Lectures, presentations and consultations also as in DLO 1. Laboratory occupation Use of technical teaching aids, use of educational and control tests, use of reference lecture notes	12/4	Study material for independent study. Completion of laboratory tasks, the implementation of which was started in the laboratory session.	20/26
DLO 3. Develop equipment and technological schemes for the production of food products enterprises and implement innovative technological solutions in food production	Lectures, presentations and consultations also as in DLO 1. Laboratory occupation Use of technical teaching aids, use of educational and control tests, use of reference lecture notes. Demonstration examples of work in applied software products	12/6	Preparation to the lecture by familiarizing yourself with the lecture material. Study material for self-study. Preparation of theoretical material in the form of publications.	20/26
DLO4. Analyze the current state of production, make innovative decisions to improve production quality improvement and formalize them in the form of scientific and technical documentation, scientific reports, security documents, articles, etc.	Lectures, presentations and consultations also as in DLO 1. Laboratory occupation Use of technical teaching aids, use of training and control tests, use of reference lecture notes. Showing examples of solving production problems using an interactive method.	26/4	Preparation to the lecture by familiarizing yourself with the lecture material. Study material for independent study. Completion of laboratory tasks, the implementation of which was started in the laboratory session.	30/54

5. EVALUATION BY EDUCATIONAL COMPONENT

5.1. Summative assessment

5.1.1. To assess the expected learning outcomes, there are

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	5-6points	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	13-17points	18-23 points	24-25 points
	Task requirements not met	Answers to all questions are provided, but	The answers to all	Answers to all questions are provided, creativity

¹Specify the summative assessment component

²Indicate the distribution of points and the criteria that determine the level of assessment

		<i>individual components of the answers are missing or insufficiently disclosed, there is no analysis of other approaches to the question.</i>	<i>questions are given</i>	<i>and thoughtfulness are demonstrated, and one's own solution to the problem is proposed.</i>
<i>Exam</i>	<i><17 points</i>	<i>18-23 points</i>	<i>24-29 points</i>	<i>30 points</i>
	<i>Task requirements not met</i>	<i>Most requirements are met, but individual components are missing or insufficiently disclosed, there is no analysis of other approaches to the issue</i>	<i>All task requirements met</i>	<i>All task requirements have been met, and the solution and approach have been demonstrated.</i>

5.8. Formative assessment:

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

<i>No.</i>	<i>Elements of formative assessment</i>	<i>Date</i>
<i>1.</i>	<i>Written survey after studying topics 1-3, 4-7</i>	<i>Week 7, Week 14</i>
<i>2.</i>	<i>Verbal feedback from the teacher while working on the test paper</i>	<i>11 weeks</i>

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

6. LEARNING RESOURCES (LITERATURE)

Main sources

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3. Savchenko M.Yu. Innovative engineering: methodological instructions for performing laboratory work for applicants of the 1st year of specialty G13 of the OPP "Food Technologies" of the higher education degree "Master". - Sumy, 2025. - 358 p.
4. Savchenko M.Yu. Innovative engineering: methodological instructions for performing independent work for applicants of the 1st year of specialty G13 of the OPP "Food Technologies" of the higher education degree "Master". - Sumy, 2025. - 96 p.
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18. Budnikevich I.M. (ed.). Establishment of a regional innovation market in Ukraine. – Chernivtsi, 2022. – 200 p.
19. Barba FJ, et al. Emerging Technologies for Food Processing: Innovation Diffusion and Lifecycle Analysis // Innovative Food Science & Emerging Technologies. - 2024. - Vol. 91. – 103523. DOI: 10.1016/j.ifset.2024.103523
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