

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

MC10 Global Progressive Engineering Innovations

Specialty	G13 "Food Technologies"
Educational program	"Food Technologies"
Level of higher education	third (educational and scientific)

Developer:

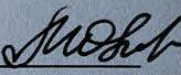
 Maryna SAVCHENKO

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)

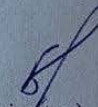
Agreed:

Educational guarantor programs


(signature)

Oksana MELNYK
(Full name)

Dean of the Faculty,
where the educational program is
implemented

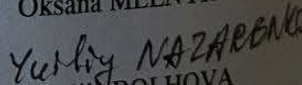

(signature)

Nataliia BOLHOVA
(Full name)

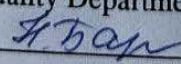
Review of the work program (attached):




Oksana MELNYK


Yurii NAZARENKO
Nataliia BOLHOVA

Methodist of the Education Quality Department,
licensing and accreditation

 **N. Baranik**
(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.	Full name EC	MC 10. Global Progressive Engineering Innovations		
2.	Status EC	Mandatory		
3.	Educational program	Food technology		
4.	Unit implementing EC	Food technology/nutrition technology		
5.	NQF level	Level 8		
6.	Semester of study	Semester 3 Study duration – 15 weeks		
7.	Volume EC	3 credits		
	Total number of hours and their distribution (full-time/part-time)	Contact work (classes)		
		Lectures 2	Practical/seminar	Laboratory 2
				86
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", "Innovative engineering", "Energy management and energy audit of processing and food enterprises"		
11.	Purpose of the educational component	Training of highly qualified specialists, including in the scientific field. As well as the acquisition, systematization and consolidation of theoretical knowledge and practical skills among students regarding the construction of an effective technological process through the adoption of innovative engineering solutions and the evaluation of the proposed solutions.		
12.	Prerequisites for study	The educational component is based on the previously studied disciplines "Automation of Food and Restaurant Production Processes", " Food Machinery and Equipment", "Energy management and energy audit of processing and food enterprises", "Innovative engineering"		
13.	Academic Integrity Policy	If a fact of academic dishonesty is discovered, the postgraduate student will not pass the exam. Code of Academic Integrity (http://surl.li/khyd)		
14.	Keywords	Engineering, world innovations, entrepreneurship, engineering services		
15.	Course number on the Moodle platform	Moodle link: https://cdn.snau.edu.ua/moodle/course/view.php?id=5969 Savchenko Maryna Yuriivna		

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

Learning outcomes for MC: After studying the 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 5	PLO 6	PLO 9	PLO 11	
DLO 1. Create innovative engineering solutions for important scientific and applied problems in food production, relying on advanced knowledge and a high level of research skills to obtain new knowledge and innovations at the level of world achievements. Implement developed technologies at enterprises, ensure scaling. Use resource-saving, waste-free technologies, renewable energy sources and environmentally friendly materials.	x				Done preparation and defense of laboratory works, control theoretical work material
DLO 2. Develop projects that meet the needs of society, contribute to consumer safety and improve the quality of life. Apply the latest equipment, automated systems and software for modeling, analysis and implementation of projects. Combine knowledge of engineering, economics, ecology and law for comprehensive problem solving.		x			
DLO 3. Analyze modern raw material storage technologies to minimize quality losses and preserve nutritional value. Create innovative engineering solutions for the safe transformation of raw materials into high-quality functional, health-improving or specialized products in accordance with legislation.			x		
DLO 4. Evaluate raw material processing technologies (heat treatment, fermentation, drying, freezing) and analyze innovations (bio-, nanotechnologies, automation) to increase production efficiency. Optimize technological parameters for resource conservation, environmental safety, and product competitiveness in domestic and foreign markets.				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 III 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		Recomm ended literature 1	
	Classroom work	Indepe nent work		
	Lc	Lb		
Topic 1. Introduction to progressive engineering innovations in world practice. Purpose and key objectives of the discipline. Definition of the concept of "engineering". Classification of types of engineering for food enterprises and their brief characteristics. Characteristics of complex, financial, industrial, direct engineering and reengineering. Characteristics of engineering. Classification of innovations. Types of engineering. Innovative engineering in the resource security of food enterprises. The essence and types of innovations in the food industry. Methodological approaches to engineering. Initiation of innovations.	-	-	15	[1-7]
Topic 2. Project management and multi-project environment. The design process in engineering. The main stages of project formation. The life cycle of project implementation. Comparison of a typical management cycle with project management processes. Multi-project management systems. Innovations in technological design. Innovative processes of new product design and analysis of project results. Key processes of project management. Characteristics of project phases. Elements of multi-project management and its system components. Methods of selecting innovative projects for implementation. Modern management of innovative projects. Innovative processes of new product design and analysis of project results.	-	-	15	[8-14]
Topic 3. Institutional and infrastructural aspects of innovation. The process of institutionalization of innovations and the necessary institutional conditions. The role of innovation infrastructure in the development of enterprises. State support for innovations: tools (tax incentives, financing, legislative regulation). Economic, social and environmental effects of innovation activity. Components of engineering. Models of engineering responsibility. Evolution of requirements for the contractor. Consulting engineering. Technological engineering. Construction engineering. Organizational and management engineering.	-	-	14	[15-18]

¹Specific source from the main or additionally recommended literature

Topic 4. Scientific, technical and innovative activities of enterprises. The concept of innovative activity of an enterprise: stages from concept to market implementation. Classification of innovations. The impact of innovations on competitiveness. Areas of innovative activity and their impact on production efficiency. Subjects of the innovation process and mechanisms of their interaction. Stages of forming an innovative model at an enterprise. Sphere of innovative activity. The concept of scientific and technical developments, inventions. Classification of innovative technologies. Provision of engineering services.	2	2	14	[19-28]
Topic 5. International dimension of engineering and innovation. International trade in services: essence, features, development factors. International technological exchange: stages of evolution. Development of engineering in Ukraine in comparison with leading countries. Characteristics of the engineering services market in Ukraine. New types of engineering services. Financial conditions for the provision of engineering services. International scientific and technological exchange. Regulatory and legal framework for international technology exchange. Features of the development of engineering services in Ukraine.	-	-	14	[29-36]
Topic 6. Scientific and technological progress in the food industry. Innovative technologies, equipment and automated equipment (including robotics) - examples of implementation. Features of the processes of drying, freezing and defrosting of food products. Technologies for intensification of the production of natural products. Energy- and resource-saving waste-free technologies: necessity and advantages. Technology of caviar products with a capsule structure. Safety assessment of the use of food, technological and biologically active additives in food products. Spread of low-temperature technologies in countries around the world. Characteristics of flour and confectionery products using biologically active additives (BAA). Radical innovations that can change the future of food products. Application of extrusion in the production of new food products. Modern adapted dairy products, their features. Characteristics of individual groups of food additives used in the dairy industry. Use of electrodialysis in technologies of children's dairy products. Cold preservation of meat products. Innovative technologies of the future. Promising technologies in the food industry. The importance of scientific and technical developments and inventions for the development of the industry. Challenges of introducing new technologies.	-	-	14	[37-45]
Total	2	2	86	

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)	Number of hours
DLO 1. Create innovative engineering solutions for important scientific and applied problems in food production, relying on advanced knowledge and a high level of research skills to obtain new knowledge and innovations at the level of world achievements. Implement developed technologies at enterprises, ensure scaling. Use resource-saving, waste-free technologies, renewable energy sources and environmentally friendly materials.	Lectures: - Informational (educational). The lecture informs students about the achievements of science and the main provisions of the academic discipline. - Orientation. Orients students to the genesis of the development of various theories. The lecturer recommends an indicative list of literature. - Stimulating arouses interest in the topic. - Motivational. - Clarifying, explanatory. Explanation of concepts that are components (core) this topic. - Convincing. With an emphasis on the evidence system. - 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. - Problematic. New theoretical material is presented as an unknown that should be discovered by solving a problem situation. Presentations (demonstration of information on the topic). Practical classes Analyze the ways of selecting the necessary information on innovations in technology using examples of calculations from scientific and technical literature Consultations. Answers to questions, exchange of opinions, a short discussion with the teacher's conclusions.	-	Preparing for the lecture by reviewing the lecture material. Searching for technical solutions in information sources	24

DLO2. Develop projects that meet the needs of society, contribute to consumer safety and improve the quality of life. Apply the latest equipment, automated systems and software for modeling, analysis and implementation of projects. Combine knowledge of engineering, economics, ecology and law for comprehensive problem solving.	Lectures, presentations and consultations same as in DLO 1. Practical occupation Use of technical teaching aids, use of educational and control tests, use of reference lecture notes	-	Study material for independent study. Completion of practical work tasks, the implementation of which was started during the practical lesson.	24
DLO3. Analyze modern raw material storage technologies to minimize quality losses and preserve nutritional value. Create innovative engineering solutions for the safe transformation of raw materials into high-quality functional, health or specialized products in accordance with legislation.	Lectures, presentations and consultations same as in DLO 1. Practical 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	-	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.	26
DLO 4. Analyze raw material processing technologies (heat treatment, fermentation, drying, freezing) and evaluate innovations (bio, nanotechnologies, automation) to increase production efficiency. Optimize technological parameters for resource conservation, environmental safety, and product competitiveness in domestic and foreign markets.	Lectures, presentations and consultations are the same as in DLO 1. Practical classes: Use of technical teaching aids, use of training and control tests, use of reference lecture notes. Demonstration of examples of solving production problems using an interactive method.	4	Preparing for the lecture by reviewing the lecture material. Studying the material for independent learning. Completing the practical work tasks, the implementation of which was started during the practical lesson.	26

5. EVALUATION BY EDUCATIONAL COMPONENT

5.1. Summative assessment

5.1.1. For the assessment of expected learning outcomes, the following is provided:

No.	Summative methods evaluation	Points/ Percentage in the overall score	Date of compilation
Module I			
1.	Written test on theoretical material	25 points / 25%	In the sixth week
2.	Completion and defense of laboratory work	25 points / 25%	Until the next lesson
Module II			
3.	Written test on theoretical material	25 points / 25%	At the fourteenth week
4.	Completion and defense of laboratory work	25 points / 25%	Until the next lesson

5.1.2. Evaluation criteria

Component ²	Unsatisfactorily	Satisfactorily	Good	Perfectly ³
Written test on theoretical material	<2-4 points Task requirements not met	5-6points 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.	7-8 points The answers to all questions are given	9-10 points Answers to all questions are provided, creativity and thoughtfulness are demonstrated, and one's own solution to the problem is proposed.
Completion and defense of laboratory work	<12 points Task requirements not met	13-17points 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.	18-23 points The answers to all questions are given	24-25 points Answers to all questions are provided, creativity and thoughtfulness are demonstrated, and one's own solution to the problem is proposed.

5.2. Formative assessment:

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

No.	Elements of formative assessment	Date
1.	Written survey after studying topics 1-3, 4-6	Week 7, Week 14
2.	Verbal feedback from the teacher while working on the test paper	11 weeks

²Specify the summative assessment component

³Indicate the distribution of points and the criteria that determine the level of assessment

6. LEARNING RESOURCES (LITERATURE)

Main sources

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4. Krasnokutska N.V. Innovation management: a textbook. – K., 2023. – 504 p.
5. Holovatyi M.F. (ed.). Innovation management: problems of formation in conditions of transitional economy. – K., 2022. – 400 p.
6. Savchuk V.S. Innovations: theory, development mechanism and commercialization: monograph. – K., 2023. – 396 p.
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Additional sources

15. Klerkx L., Rose DC Digitalization and Innovation Engineering in Agri-Food Systems: Global Trends and Challenges // Agricultural Systems. - 2022. - Vol. 203. – 103512. DOI: 10.1016/j.agsy.2022.103512
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17. Nayak R., Waterson P. Human-Centric Innovation Engineering in Food Production: Optimizing Labor and Processes // Applied Ergonomics. - 2024. - Vol. 115. – 104178. DOI: 10.1016/j.apergo.2023.104178

18. Budnikevich I.M. (ed.). Establishing 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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Software

- SCADA systems (Ignition, WinCC)
- Project management software (MS Project, Jira, Trello)