Ministry of Education and Science of Ukraine

Sumy National Agrarian University

Faculty of Food Technology

Food Technology Department

Working program (syllabus) educational component

Educational Component 10 SCIENTIFIC BASIS OF WASTE-FREE TECHNOLOGIES OF FOOD INDUSTRY

Under implementation in within the educational programs **« Food technologies »**

by specialty **181 « Food technologies »**

at the second (master's) level higher education

Sumy – 2025

Developer: _____ **Dmytro BIDIUK,** Ph.D., Senior Lecturer, Food Technology Department
(signature) (surname, initials) (academic degree and title, position)

Considered , approved and ratified at the meeting departments **technology food** (name departments)	minutes of 04.06.2025 No. 23
	Manager departments _____ (signature) Oksana MELNYK (last name , initials)

Agreed:

Guarantor educational programs Maryna SAVCHENKO
(signature) (first name LAST NAME)

Dean faculty,

where is being implemented educational program _____ Natalia BOLGOVA
(signature) (first name SURNAME)

Review on working program (attached) provided by: _____ Oksana MELNYK
(signature) (first name LAST NAME)

_____ Serhiy BOKOVETS
(signature) (first name SURNAME)

Methodist department qualities education,

licensing and accreditation _____ Svitlana Kovalevets
(signature) (first name LAST NAME)

Registered in electronic base: date: 24.08. 2025

Information about revision working programs (syllabus):

Educational year , in to whom are introduced changes	Application number to working programs with description changes	Changes considered and approved		
		Date and number protocol meeting departments	Manager departments	Guarantor educational programs

1. GENERAL INFORMATION ABOUT EDUCATIONAL COMPONENT

1.	Name of Educational Component	Scientific foundations of waste-free technologies in the food industry			
2.	Faculty / department	Food technology / department of technology food			
3.	Status of Educational Component	Mandatory			
4.	Program / Specialty (programs) that include an educational component for	Educational program : Food technologies / specialty:181 « Food technologies »			
5.	An educational component may be offered for	241 «Hotel and restaurant business»			
6.	National Qualifications Framework Level	7th level			
7.	Semester and duration study	Third semester Duration study – 15 weeks			
8.	Number loans ECTS	5 loans			
9.	General amount of hours and their distribution	Contact work (class)			Independent work
		Lectures	Practical / seminar	Laboratory lesson	
		2	**-**	**0**	**148**
10.	Language teaching	English			
11.	Teacher / Coordinator educational component	BIDIUK Dmytro Olegovych			
11.1	Contact information	Audience Department 212 m, building №4. Tel. (050) 781-20-27 , E - mail : dmytro.bidiuk@gmail.com Consultation hours : every Wednesday from 13:00 to 14:00			
12.	General description educational component	Within the framework of this educational component, an idea of modern technologies for the extraction of valuable biologically active substances from by-products of the food industry is provided. The student will be familiarized with the optimization of food processing technologies to minimize the formation of food waste, by-products of the food industry, using them to create useful products with added value for food and non-food purposes. The discipline reviews the problems associated with food waste, considers ways to dispose of food waste, by-products of the food industry, taking into account global environmental standards and as a means of achieving sustainable development goals.			
13.	Goal educational component	Familiarization with the latest research and practice in the field of waste-free, resource-saving technologies for food production, areas of processing and utilization of food waste and by-products of the food industry into valuable products, taking into account global environmental requirements.			
14.	Prerequisites for studying the educational component, connection with other educational components of the educational program	The educational component has connection with others educational components « Theoretical foundations food productions ", " Food quality and safety management "			
15.	Policy academic virtue	When detecting the fact of copying during the exam – the student's work is canceled and exam is reassembled.			
16.	Link for the course in the system Moodle	https://cdn.snau.edu.ua/moodle/enrol/index.php?id=5044			
17.	Keywords	Waste-free technologies, circular economy, sustainable development, food waste, by-products, environmental requirements			

2. RESULTS TEACHING BY EDUCATIONAL COMPONENT AND THEIR

CONNECTION WITHSOFTWARE LEARNING OUTCOMES

Learning outcomes for the educational component: After studying the educational component, the student is expected to be able to…»	Program learning outcomes					How is academic discipline assessed??
	Learning Outcome 3	Learning Outcome 7	Learning Outcome 13	Learning Outcome 17	Learning Outcome 18	
1. demonstrate knowledge of waste-free technologies in the conditions of existing food industry enterprises and restaurant establishments, the use of new methods of preserving and storing food products, the use of bioplastics for packaging raw materials, semi-finished products and finished products;					X	*Rating knowledge through testing processing of the basic notes of lectures and laboratory classes* *Exam* *Computer testing (certification)*
2. demonstrate knowledge of the latest trends in the field of waste-free resource-saving technologies for food production, areas of processing and utilization of food waste and by-products of the food industry into valuable products;			X		X	
3. demonstrate knowledge of modern methods of processing food raw materials and waste, the latest technologies for extracting valuable biologically active substances from by-products of the food industry;			X	X	X	
4. demonstrate knowledge of areas of optimization of food processing technologies to minimize the formation of food waste, by-products of the food industry, ways of using them to create useful food and non-food products, problems associated with food waste;		X				
5. demonstrate initiative and ingenuity in the development and implementation of technical and technological innovations. Be able to independently make non-standard creative decisions, bear responsibility for them, generate new ideas and implement them in practical activities, demonstrate the ability to adapt;	X					
6. demonstrate the ability to select and apply the most suitable methods of mathematical modeling and optimization when developing scientific and technical projects in the field of food technology;		X				
7. demonstrate the ability to develop and improve food production technologies, design the composition of food products, develop technologies for storing and preserving semi-finished products and finished products;			X			
8. demonstrate the ability to develop and implement innovative technological solutions to solve existing problems and further develop food technologies, reproduce the results of scientific research and testing in the production conditions of				X		

actually operating enterprises, develop foreign economic relations of food industry enterprises and restaurant establishments;						
9. demonstrate the ability to assess the properties of food waste and by-products of the food industry, extract valuable biologically active substances from them, scientifically substantiate and experimentally confirm technologies for new food products using food waste and by-products of the food industry.			X	X	X	

3. CONTENT OF THE EDUCATIONAL COMPONENT (CURRICULUM)

Topic. List questions that will be considered within topics	Distribution in within general budget time			Recommended literature
	Auditorium study		Independent study	
	Lectures	Lab. lesson		
Topic 1. Side effects products food industry and their using 1. Waste food industry and related products for industrial use application . 2. By-products of the meat and poultry processing industry. 3. By-products of the dairy industry 4. Modern approaches to the implementation of waste-free technologies in the food industry: theoretical foundations and practical solutions Independent study 1. By-products from the grain processing industry. Fruit and vegetable by-products. By-products from seafood processing. Laboratory lesson 1. Study of organoleptic, physicochemical and functional and technological indicators of by-products of the food industry	2	-	28	[1-7]
Topic 2. Bioprocessing of waste from beef, pork, chicken and egg production 1. Various by-products and waste from beef and pork processing. 2. By-products and waste generated during the processing of chicken meat and eggs. 3. Valorization of waste from beef and pork processing. Independent study 2. Chicken waste processing by-products . Valorization of egg waste. Laboratory lesson 2. Use of food industry by-products in food products	-	-	30	[1-7]
Topic 3. Bioprocessing of beverage industry waste. 1. Coffee processing. By-products and waste from coffee processing. Disposal of coffee by-products and waste. 2. Tea processing and production. Tea by-products and waste and their disposal. Independent study 3. Fruit juice and soft drinks. Alcoholic beverages. Beer production. By-products and wastes of the brewing industry and their use. Wine production. Laboratory lesson 3. Use used up coffee oil cake in technology biodegradable food packaging products	-	-	30	[1-7]
Topic 4. By-products of fruit processing. 1. Phenolic compounds as functional food. 2. Fruit sources of by-products. 3. Agro-industrial by-products.	-	-	30	[1-7]

Independent study 4. Fiber-rich foods. Hemicelluloses. Pectins. Value-added products from fruit processing by-products. Laboratory lesson 4. Receiving extracts and zest flour citrus fruits and their use in technology food products				
Topic 5. Utilization of plant waste. 1. Biogas and electricity production from plant waste. 2. Plant waste as biohumus . 3. Biofuels and biochar from plant waste. 4. Fish food from plant waste. 5. Aquaponics using plant waste. 6. Waste as animal feed. 7. Biodegradable plastic. 8. Plant waste as substrates in citric acid production Independent study 5. Extraction of biologically active compounds from plant waste. Methods of extraction of biologically active compounds . Dietary fiber from plant waste. Resistant starch from plant waste. Activated carbon from plant waste. Plant waste as substrates in citric acid production Laboratory lesson 5. Study process composting food waste	-	-	30	[1-7]
Total	**2**	**-**	**148**	

4. TEACHING AND LEARNING METHODS

Learning outcomes by educational component	**Methods teaching** (work to be carried out teacher during classroom lessons , consultations)	**Number hours 6**	**Methods teaching** (which types educational activities has perform student independently)	**Number 7 hours**
1. demonstrate knowledge of waste-free technologies in the conditions of existing food industry enterprises and restaurant establishments, the use of new methods of preserving and storing food products, the use of bioplastics for packaging raw materials, semi-finished products and finished products;	Lecture class (teaching) lecture hall material , conversation , demonstration graphic material)	6	Introduction to the lecture material , design of the supporting lecture notes . Presentation accepted decisions and preparation abstracts , reports with visual escort	12
2. demonstrate knowledge of the latest trends in the field of waste-free resource-saving technologies for food production, areas of processing and utilization of food waste and by-products of the food industry into valuable products;	Lecture class (teaching) lecture hall material , conversation , demonstration graphic material)	6	Introduction to the lecture material , design of the supporting lecture notes . Presentation accepted decisions and preparation abstracts , reports with visual escort	12
3. demonstrate knowledge of modern methods of processing food raw materials and waste, the latest technologies for extracting valuable biologically active substances from by-	Laboratory class (consideration) technological situations with the provision of recommendations regarding solution technological problems of production)	6	Presentation results laboratory classes, design reports	12

products of the food industry;				
4. demonstrate knowledge of areas of optimization of food processing technologies to minimize the formation of food waste, by-products of the food industry, ways of using them to create useful food and non-food products, problems associated with food waste;	Laboratory class (consideration) technological situations with the provision of recommendations regarding solution technological problems of production)	6	Presentation results laboratory classes, design reports	12
5. demonstrate initiative and ingenuity in the development and implementation of technical and technological innovations. Be able to independently make non-standard creative decisions, bear responsibility for them, generate new ideas and implement them in practical activities, demonstrate the ability to adapt;	Lecture class (teaching) lecture hall material , conversation , demonstration graphic material)	6	Introduction to the lecture material , design of the supporting lecture notes . Presentation accepted decisions and preparation abstracts , reports with visual escort	12
6. demonstrate the ability to select and apply the most suitable methods of mathematical modeling and optimization when developing scientific and technical projects in the field of food technology;	Laboratory class (consideration) technological situations with the provision of recommendations regarding solution technological problems of production)	6	Presentation results laboratory classes, design reports	12
7. demonstrate the ability to develop and improve food production technologies, design the composition of food products, develop technologies for storing and preserving semi-finished products and finished products;	Laboratory class (consideration) technological situations with the provision of recommendations regarding solution technological problems of production)	6	Presentation results laboratory classes, design reports	10
8. demonstrate the ability to develop and implement innovative technological solutions to solve existing problems and further develop food technologies, reproduce the results of scientific research and testing in the production conditions of actually operating enterprises, develop foreign economic	Laboratory class (consideration) technological situations with the provision of recommendations regarding solution technological problems of production)	4	Presentation results laboratory classes, design reports	10

relations of food industry enterprises and restaurant establishments;				
9. demonstrate the ability to assess the properties of food waste and by-products of the food industry, extract valuable biologically active substances from them, scientifically substantiate and experimentally confirm technologies for new food products using food waste and by-products of the food industry.	Laboratory class (consideration) technological situations with the provision of recommendations regarding solution technological problems of production)	4	Presentation results laboratory classes, design reports	8

5. EVALUATION BY EDUCATIONAL COMPONENT

5.1 . Summative evaluation

5.1.1 For evaluation expected results teaching provided

No.	Methods summative evaluation	Points / Weightin generalassessment	Date drafting
Module 1 (50 points)			
1.	Midterm testing (multiple choice test)	*50 points / 50%*	Modular week 1
Module 2 (50 points)			
1.	Midterm testing (multiple choice test)	*50 points / 50%*	Modular week 2

5.1.2. Criteria evaluation

Component [8]	**Evaluation**
Midterm testing – multiple choice test	*The test includes 25 questions, each of which is worth 2 points.*

5.2. Formative evaluation:

For evaluation current progress in training and understanding directions further improvement provided

No.	**Elements formative evaluation**	**Date**
1	Oral survey after studying the topics	After the lesson
2	Feedback from the teacher in the form of a discussion of midterm testing	According to schedule

6. EDUCATIONAL RESOURCE (LITERATURE)

6.1. Basic sources

1. Integrated Processing Technologies for Food and Agricultural By-Products. Zhongli Pan Ruihong Zhang Steven Zicari. 1st Edition. 2019 - Academic Press. 452 P.

6.2. Information resources

2. Food Waste and Byproducts: An Opportunity to Minimize Malnutrition and Hunger in Developing Countries [Electronic resource] / Access mode: https://www.frontiersin.org/articles/10.3389/fsufs.2018.00052/full

3. Review: Food Industry By-Products used as a Functional Food Ingredients [Electronic resource] / Access mode: https://www.longdom.org/open-access/review-food-industry-byproducts-used-as-a-functional-food-ingredients-2252-5211-1000248.pdf

4. Agro -Food Byproducts as a New Source of Natural Food Additives [Electronic resource] / Access mode: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6471601/
5. Utilization of food processing by-products [Electronic resource] / Access mode: https://www.hilarispublisher.com/proceedings/utilization-of-food-processing-byproducts-8455.html
6. Valorization of Food Processing By-Products [Electronic resource] / Mode Access : https://www.semanticscholar.org/paper/Valorization-of-Food-Processing-By-Products-Chandrasekaran/f936da50bcdf015a83201e398faabc6f2db857ea
7. Food Byproducts as Sustainable Ingredients for Innovative and Healthy Dairy Foods [Electronic resource] / Access mode: https://pubmed.ncbi.nlm.nih.gov/30249001/

Review on working program (syllabus)

Parameter, by which is being evaluated working program (syllabus) of an educational component by a guarantor or memberproject group	**Yes**	**No**	**Comment**
The learning outcomes for the educational component are aligned with the National Qualifications Framework			
The learning outcomes for the educational component correspond to the intended program learning outcomes (for mandatory educational components)			
Results teaching by educational component give the opportunity to measure and to evaluate level their achievement			

Member of the educational program
project team "Food Technologies" Oksana MELNYK _____
(name) (full name) (signature)

Parameter by which the work program is evaluated(syllabus) of the educational component by the teacher of the relevant department	**Yes**	**No**	**Comment**
General information about educational component there are sufficient			
The learning outcomes for the educational component are aligned with the National Qualifications Framework			
Results teaching by educational component give the opportunity to measure and to evaluate level their achievement			
Results teaching relate to students competencies, and not content disciplines (contain knowledge, skills,skills, and not topics educational programs disciplines)			
The content of the educational component is formed in accordance with the structural and logical scheme			
Educational activity (teaching and learning methods) gives opportunity students achieve expected results training			
The educational component involves learning through research, What there are appropriate and sufficient for relevantequal higher education			
Strategy assessment within educational component corresponds politics University/Faculty			
The provided assessment methods allow assessing the degree of achievement of learning outcomes by educational component.			
Load students there are adequate volume educational component			
The recommended learning resources are sufficient to achieve results teaching			
Literature there are relevant			
The list of learning resources contains the necessary software products to achieve learning outcomes for the educational component			

Reviewer (teacher departments) food technology Serhiy BOKOVETS _____
(name) (position, Full name) (signature)