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

WORK PROGRAM OF EDUCATIONAL DISCIPLINE (SYLLABUS)

SC 2 Engineering innovations

It is implemented within the educational program
Food technologies
in specialty 181 "Food technologies"

third (educational and scientific) level of higher education

Sumy - 2024

Developer: _____ **Maryna SAVCHENKO**

Ph.D., Associate Professor of the Nutrition Technology Department

Considered, approved and approved at the meeting of the department of food technology	Protocol No. 19 from 31.05.24
	Head department _____ (signature) **Oksana MELNYK** (surname, initials)

Agreed:

Guarantor of the educational program _____ (signature) Oksana MELNYK (surname)

Dean of the Faculty,
where the educational program is implemented _____ (signature) Natalia Bolhova (surname)

Review of the work program (attached) provided by: _____ Olga SEREDA (surname)

_____ Fedyr PERTSEVOY (surname)

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

Registered in the electronic database: date: 24.06 2024.

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Information on viewing the work program (syllabus):

The academic year in which the changes are made	The number of the annex to the work program with a description of the changes	The changes were reviewed and approved		
		Date and number of the protocol of the meeting of the department	Head of Department	Guarantor of the educational program

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

1.	The name is OK	Innovation engineering			
2.	Faculty/department	Food technology/ Nutrition Technology			
3.	The status is OK	Selective			
4.	Program/Specialty (programs), which is a component of OK for (to be filled in for mandatory OK)	Educational program: Food technologies/specialty: 181 "Food technologies"			
5.	OK can be offered for (to be completed for selective OKs)				
6.	NRK level	8th level			
7.	Semester and duration of study	The fourth semester The duration of study is 15 weeks			
8.	Number of ECTS credits	5 credits			
9.	The total number of hours and their distribution (full-time study/part-time study)	Contact work (class)			Independent work
		Lectures **24**	Practical/seminar **36**	Laboratory	**90**
10.	Language of education	Ukrainian			
11.	Teacher/Coordinator of the educational component	The teacher is Ph.D., associate professor of the Nutrition Technology Department, Savchenko Maryna Yuriivna			
11.1	Contact Information	Auditorium of the department 314m, building #4, phone: 0993834398, E-mail: marina.saw4encko2011@gmail.com , consultation hours: every Monday from 1 to 2 p.m.			
12.	General description of the educational component	Theoretical and practical material provides generalized information sources for building effective technological processes at processing and food enterprises. During studying the discipline, students consider the possibilities of improving the technological processes of food production, effective use of resources - project, technological, financial, personnel.			
13.	The purpose of the educational component	Training of highly qualified specialists, including in the scientific field. As well as the acquisition, systematization and consolidation of students' theoretical knowledge and practical skills regarding the construction of an effective technological process through the adoption of innovative engineering solutions and the evaluation of proposed solutions.			
14.	Prerequisites for studying OK, connection with other educational components of OP	The educational component is connected with other educational components "Automation of production processes", "Processes and devices of food industries", "Technological equipment of food industries", "Energy management and energy audit of processing and food enterprises"			
15.	Policy of academic integrity	If the fact of writing off is discovered during the exam, the post-graduate student's work is canceled and the exam is retaken. Code of academic integrity (http://surl.li/khyd)			
16.	Link to the electronic resource	Moodle link: https://cdn.snau.edu.ua/moodle/course/view.php?id=5586			

2. LEARNING RESULTS UNDER THE EDUCATIONAL COMPONENT AND THEIR RELATIONSHIP WITH PROGRAM LEARNING OUTCOMES

Study results for EC: After studying educational component, the student is expected to be able to..."	Program learning outcomes, the achievement of which is aimed at the EC (indicate the number according to the numbering given in the EP)[1]				The result of learning the discipline is evaluated
	PLO 3	PLO 12	PLO 13	PLO 15	
DLO 1. To ensure optimization and innovative approaches to the scientific, technical and innovative activities of enterprises. Analyze innovative principles use of equipment. Systematizethe main stages of technology implementation in production.	x				Execution and protection of practical works. Control work on theoretical material.Exam
DLO 2. Carry out technical and economic analysis indicators of innovative projects. To develop scientific innovative engineering projects, taking into account the specifics of the specialty.		x			
DLO 3. To be able to evaluate the effectiveness of technology implementation in production. Develop modes of operation of the equipment in order to optimize them and optimize work				x	
DLO 4. Analyze the current state of production, adopt and develop innovative solutions to improve the quality of production and draw up schemes for the production of food products of the enterprise, using modern tools			x		

[1]It must correspond to the Matrix of ensuring the programmatic learning outcomes by the relevant components of the educational program, it is specified for the compulsory educational components of OP I and II level, for all (mandatory and selective OK) OP III

3. CONTENTS OF THE EDUCATIONAL COMPONENT (CURRICULUM PROGRAM)

Topic. List of issues to be considered within the topic	Distribution within the general time budget			Recommended Books
	Auditory work		Independent work	
	Lc	Pc		
Topic 1. Concepts and types of engineering. The purpose of studying the discipline. Tasks of the discipline. Forms of engineering activity. Characteristics of complex, financial, industrial, direct engineering and reengineering. Characteristics of engineering. General characteristics of innovative 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. Methodical approaches to engineering. Initiating innovations.	4	6	15	[1-4]
Topic 2. Scientific, technical and innovative activities of enterprises. Concept of innovative activity. Purpose of entrepreneurial activity. Subjects of innovative activity. Directions of innovative activity of enterprises. Stages of formation of an innovative model at the enterprise. The sphere of innovative activity. The concept of scientific and technical developments, inventions. Classification of innovative technologies. Provision of engineering services.	4	6	15	[4-8]
Topic 3. Modern management of innovative projects. Concept of innovation process. Projects in engineering. Subjects of the innovation process of the food industry. Life cycle of project implementation. Project management processes. Comparison of a typical management cycle and project management processes. Multi-project management systems. Innovations in technological design. Innovative processes of new product design and analysis of project results. Project management. Methods of selecting innovative projects for implementation. Modern management of innovative projects. Innovative processes of new product design and analysis of project results.	4	6	15	[9,14,19]

Topic 4. Creation of infrastructure facilities in the food business Engineering components. Engineering responsibility models. The evolution of requirements for contractors. Consulting engineering. Technological engineering. Construction engineering. Organizational and management engineering.	4	6	15	[10-13,17]
Topic 5. International activity of providing engineering services International trade in engineering services. International market of engineering technologies. Financial conditions for the provision of engineering services. International scientific and technological exchange. Regulatory framework of international exchange of technologies. Peculiarities of the development of engineering services in Ukraine.	4	6	15	[5,6,15-18]
Topic 6. Global and domestic innovations. Innovative processes of drying, freezing and defrosting food products. Innovative technologies, equipment and automated equipment (robotics). Technology of caviar products with a capsule structure. Energy- and resource-saving waste-free technologies. Safety of use of food, technological and biologically active additives.	4	6	15	[16,19]
In total	**24**	**36**	**90**	

4. TEACHING AND LEARNING METHODS

DLO	Teaching methods (work,which will be conducted by the teacher during classroom classes, consultations)	Num-ber of hours	Teaching methods (which types of educational activities must be performed by the student	Num-ber of hours
DLO 1. To ensure optimization and innovative approaches to the scientific, technical and innovative activities of enterprises. Analyze innovative principles of equipment use. Systematize the main stages of technology implementation in production.	**Lectures:** Informational (educational). The lecture informs students about the achievements of science, the main provisions of the academic discipline. Orientation. Orients students to the genesis of the development of various theories. The lecturer recommends an approximate list of literature. - Stimulating arouses interest to the topic. - Motivational. - Explaining, explaining. Explanation of concepts that are components (core) of this topic. - Convincing. With an emphasis on the evidence system. - Developing connected 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 subject). Practical classes Analyze, using examples of calculations from scientific and technical literature, the ways of selecting the necessary information regarding innovations in technology **Consultations.** Answers to questions, exchange of opinions, a small discussion with the teacher's conclusions.	15	Preparation to the lecture by reading the lecture material. Search for technical solutions in information sources	22

DLO 2. Carry out technical and economic analysis indicators of innovative projects. To develop scientific innovative engineering projects, taking into account the specifics of the specialty	**Lectures, presentations and consultations** the same as in DRN 1. **Practical occupation.** The use of technical teaching aids, the use of educational and control tests, the use of reference notes of lectures	15	Study material for self-study. Completion of tasks of practical work, the implementation of which began in the practical session.	22
DLO 3. To be able to evaluate the effectiveness of technology implementation in production. Develop modes of operation of the equipment in order to optimize them and optimize work	**Lectures, presentations and consultations** the same as in DRN 1. **Practical occupation.** The use of technical teaching aids, the use of educational and control tests, the use of reference notes of lectures. Demonstration examples of work in applied software products	15	Preparation to the lecture by reading the lecture material. Study material for self-study. Preparation of theoretical material in the form of publications.	24
DLO 4. Analyze the current state of production, adopt and develop innovative solutions to improve the quality of production and draw up schemes for the production of food products of the enterprise, using modern tools	**Lectures, presentations and consultations** the same as in DRN 1. **Practical occupation.** The use of technical teaching aids, the use of educational and control tests, the use of reference notes of lectures. Showing examples of solving production problems using an interactive method.	15	Preparation to the lecture by reading the lecture material. Study material for self-study. Completion of tasks of practical work, the implementation of which began in the practical session.	22

5. EVALUATION BY THE EDUCATIONAL COMPONENT

5.1. Summative assessment

5.1.1. To evaluate the expected learning results, it is provided

No	Summative methodsassessment	Points/ Percentage in the overall assessment	Compilation date
	Module I		
1.	writtencontrol work on theoretical material	*10 points / 10%*	In the sixth week
2.	Performance and protection of laboratory	*25 points / 25%*	Until the next laboratory session
	Module II		
3.	Written control work on the theoretical material	*10 points / 10%*	In the fourteenth week
4.	Performance and protection of laboratory work	*25 points / 25%*	Until the next laboratory session
5.	Exam- a written response to the ticket	*30 points / 30%*	

5.1.2. Evaluation criteria

Component	**Unsatisfactorily**	**Satisfactorily**	**Fine**	**Perfectly**
Written control work on the theoretical material	*<2-4 points*	*5-6*points	*7-8 points*	*9-10 points*
	Task requirements not met	*Answers to all questions are given, but individual components of the answers are missing or insufficiently disclosed, there is no analysis of other approaches to the question*	*All questions are answered*	*Answers to all questions are given, creativity and thoughtfulness are demonstrated, and one's own solution to the problem is proposed*
Performance and protection of laboratory work	*<12 points*	*13-17*points	*18-23 points*	*24-25 points*
	Task requirements not met	*Answers to all questions are given, but individual components of the answers are missing or insufficiently disclosed, there is no analysis of other approaches to the question*	*All questions are answered*	*Answers to all questions are given, creativity and thoughtfulness are demonstrated, and one's own solution to the problem is proposed*
	<17 points	*18-23 points*	*24-29 points*	*30 points*

Exam	*Task requirements not met*	*Most of the requirements are met, but individual components are missing or insufficiently disclosed, there is no analysis of other approaches to the issue*	*All requirements of the task have been fulfilled*	*All the requirements of the task have been fulfilled, the own solution and approach have been demonstrated*

5.2. Formative assessment:

To assess the current progress in learning and understand the directions for further improvement is provided

No	***Elements of formative assessment***	***Date***
1.	*Written survey after studying topics 1-3, 4-6*	*7 week, 14 week*
2.	*Verbal feedback from the teacher while working on the control work*	*11 week*

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

6. EDUCATIONAL RESOURCES (LITERATURE)

1. Yaroschuk A.O. Ukraine in the international exchange of engineering and technical services / A.O. Yaroschuk // Management of economic processes in the world and national economy: coll. theses of sciences works - K.: Analytical Center "New Economy", 2022. - 144 p.

2. Kuzmin O.E. Foreign experience in engineering / O.E. Kuzmin, V.Y., Zhezhukha, N.A. Horodyska // Problems of economy. – 2018. – No. 3. -WITH. 240 - 245.

3. V. Myasnikov. Engineering companies will stop fictitious modernization / V. Myasnikov// Independent newspaper. – 2021. – No. 7. - P.26 - 32.

4. Rumyantsev A.P. The world market of services: [study. manual] / A.P. Rumyantsev, Yu.O. Kovalenko. - K: Center for Educational Literature, 2019. - 456 p.

5. Kondratyuk A.A. Development of international engineering: global trends and domestic realities / A.A. Kondratyuk, I.M. Manaenko. // Collection of scientific works of young scientists of FMM NTUU "KPI named after Igor Sikorsky". – 2018. – No. 11.

6. Tugai O.A., Vlasenko T.V. General basics of engineering activity and its current state in Ukraine. // New technologies in construction. No. 34. - 2018.
http://ntinbuilding.ndibv.org.ua/archive/2018/34_2018/5.pdf

7. Technological innovations and practices in engineering education: a review. Marcela Hernandez-de-Menendez & Ruben Morales-Menendez . International Journal on Interactive Design and Manufacturing (IJIDeM) volume 13, pages 713–728 (2019).

8. Ikhlaq Sidhu. Innovation Engineering: Principles and Methodology. May 22, 2019.https://scet.berkeley.edu/innovation-engineering-principles-and methodology/

9. Bondar K. Assessment of the risks of implementing an innovative project.
URL:http://www.rusnauka.com/20_PRNiT_2007/Economics/23668.doc.htm

10. Kavetsky V. V., Prychepa I. V., Nikiforova L. O. Economic justification of innovative solutions: training. manual. Vinnytsia: VNTU, 2019. – 136 p.

11. Kirylenko I. V. The role of venture financing in the development of innovative activity. Bulletin of Taras Shevchenko Kyiv National University. 2019. No. 24–25. -WITH. 87–91.

12. Management of innovative activity: master's course: textbook / B. M. Andrushkiv, O. B. Boyko, Y. Ya. Vovk, I. P. Vovk, O. M. Vladimir, P. D. Dudkin, I. A. Kinash, L. Ya. Malyuta, N. Yu. Marynenko, L. M. Melnyk, G. S. Nagornyak, V. A. Palyanitsa, O. B. Pogaidak, O. V. Skidan , I.I. Stoyko, I.B. Fedyshyn, R.P. Sherstyuk. Ternopil: FOP Palyanytsia V.A., 2019. –1146 p.

13. Management of innovations: education. manual / O. I. Gutorov, L. I. Mykhaylova, I. O. Sharko, S. G. Turchina, O. V. Kyrychok. Kind. 2nd, add. Kharkiv: "Disa plus", 2019. - 266.

14. Project management: training. manual / editor: L. Ye. Dovgan, G. A. Mohonko, I. P. Malik. K.: KPI named after Igor Sikorskyi, 2019. – 420 p.

15. Vlasova A.M., Krasnokupskyi N.V. Innovative management: Education. manual. - K.: KNEU, 2018 - 92 p.

16. Establishment of a regional innovation market in Ukraine / Ed. I.M. Budnikevich. Chernivtsi: 2022. – 200 p.

17. Reference summary of the lectures of the discipline "Innovative engineering in the restaurant industry" for students of the specialty 8.05170112 "Food technology" of the educational qualification level master of full-time education [Electronic resource] / compiled by A.B. Horalchuk, O.Yu. Nagornyi, O.V. Kotlyar. -Electron. data. - Kh.: KhDUHT, 2019. - 1 electron. wholesale disc (CD-ROM); 12 cm. – Title from tit. screen

18. Engineering in the restaurant business: study guide OB Kuzmin. O.V. Chemakin L.M. Akimov. AM Km I.JI. Korepka And O. Kuzmin. - Kherson: OLDI-PLUS. 2019. - 488 p.

19. Innovative engineering: study guide for students of the 1st year of specialty 181 "Food technologies", full-time and part-time forms of study of the Master's degree / M. Yu. Savchenko-Pererva. – Sumy, 2023. - 81 p.